9. Nematode Resistant Pineapple

U. S. commercial pineapple production for both fresh market and processing is centered in Hawaii, with annual production of more than 352,000 tons. Pineapple plants produce up to three harvests during their three or four year lifespan. Multiple fruit production depends on a healthy root system for accumulating necessary water and nutrients. Root-feeding nematodes are therefore a major limiting factor in pineapple production. The reniform nematode is the primary nematode pest for Hawaiian pineapple and is present in most fields. Reduction is marketable yields due to uncontrolled nematode populations have been reported to be as high as 38% in the first harvest and 60% in the second.

Nematode management in Hawaiian pineapples currently includes a six to twelve month fallow period followed by preplant soil fumigation with methyl bromide or 1,3-D to reduce losses in the first crop. In order to ensure a marketable second and possible third crop, postplant applications of nematicides such as fenamiphos are used. As regulatory pressures increase on these nematicide materials and interest for reducing pesticide use grows, researchers in the pineapple industry, supported by USEPA's Pesticide Environmental Stewardship Program, are looking for cost effective alternatives.

Pineapple plants of the commercially common variety 'Smooth Cayenne' have been transformed with a wild rice gene modified for more efficient expression in pineapple tissue. The wild rice gene codes for cystatin, a naturally occurring proteinase inhibitor that interferes with nematode feeding and digestion, thereby reducing root damage and nematode populations. Transformed pineapple plants have tested successfully for cystatin expression in the roots. Future tests will evaluate their resistance to reniform nematodes.

Potential Impacts of Nematode Resistant Transgenic Pineapple
Change in Pesticide Use: 1.4 million lbs./yr. reduction in fumigants and nematicides
Change in Production Costs: $2.1 million/yr. net savings in nematode control

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